MEDION

MD-1772A
MD-1772LA

A-1770NSL/NST

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1 Precautions

Follow these safety and servicing precautions to prevent damage and to protect against potential hazards such as electrical shock and X-rays.

1-1 Safety Precautions

1-1-1 Warnings

1. For safety purpose, do not attempt to modify the circuit board, and always disconnect the AC power before performing servicing on the monitor.
2. Operation of the monitor outside its cabinet or with the cover removed involves the risk of shock hazard. Repair work on the monitor should only be attempted by service personnel who are thoroughly familiar with all necessary safety precautions and procedures for working on high voltage equipment.
3. Do not lift the CRT by the neck. After completely discharging the high voltage anode, handle the CRT only when wearing shatterproof goggles. Try to keep the CRT away from the body during handling.
4. High voltage should always be kept at the rated value, no higher. Only when high voltage is excessive are X-rays capable of penetrating the shell of the CRT. Operation at high voltages may also cause failure of the CRT or high voltage circuitry.
5. The CRT is especially constructed to limit X-ray emission to 0.5mR/HR at 300 microamperes anode current. To ensure continued X-ray protection, replace the CRT with only the same or equivalent type as the original, and adjust the anode's voltage to the designated maximum rating, never to exceed.

1-1-2 Safety Checks

Before returning the monitor to the user, perform the following safety checks:

1. Inspect to make certain that each lead dress is not pinched or that hardware is not lodged between the chassis and other metal parts in the monitor.
2. Inspect all protective devices such as nonmetallic control knobs, insulating materials, cabinet backs, adjustment and compartment covers or shields, isolation resistor-capacitor networks, mechanical insulators, etc.
3. AC Leakage Current Check

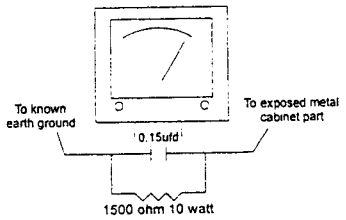
   Always perform the AC Leakage Current Check on the exposed metal parts, including metal cabinets, screwheads and control shafts. as follows:

   a) Plug the AC line cord directly into a rated AC outlet. Do not use an isolation transformer during the check.

   b) Use an AC voltmeter with at least 5000 ohms per volt sensitivity as follows:

   Connect a 1500 ohms, 10 watt resistor paralleled by a 0.15uF AC capacitor in series with all exposed metal cabinet parts and a known earth ground, such as electrical conduct or electrical ground connected to earth ground, as shown in the Figure 1-1. Measure the AC voltage across the combination of resistor and capacitor.

Figure 1-1. Set Up For AC Leakage Current Check



   c) Reverse the AC plug at the AC outlet and repeat the steps for AC voltage measurements for each exposed metal part.

   d) Voltage reading must not exceed 0.3 volts RMS, equivalent to 0.2 milliampere AC. Any value exceeding this limit ill constitute a potential shock hazard and must be corrected immediately.

1-1-3 Product Safety Notices

Many electrical and mechanical parts in this chassis have special safety-related characteristics which are often not evident from visual inspection, the protection afforded by them may not be obtained by replacing them with components rated for higher voltage, wattage, etc. Before replacing any of these components, consult the Recommended Spare Parts List given at the end of this manual. Any of the replacements that do not provide the same safety characteristics may result in shock, fire, X-ray emission or other hazards.

1-2 Servicing Precautions

Warning: An electrolytic capacitor installed with the wrong polarity might explode.

Caution: Before performing servicing covered by this service manual, read and follow the Safety Precautions section of this manual.

Note: If unforeseen conflict between the following servicing precautions and any of the safety precautions, always follow the safety precautions

1. Follow closely the servicing precautions printed on the monitor cabinet and chassis.
2. Always unplug the AC power cord from the AC power source before removing or installing any component or assembly, disconnecting PCB plugs or connectors and connecting a test component in parallel with a capacitor.
3. When replacing parts or circuit boards, clamp the lead wires around the component before soldering.
4. When replacing a high wattage resistor (>0.5W metal oxide film resistor) in the circuit board, keep the resistor about 1 cm (1/2 inch) away from the circuit board.
5. Keep wires away from the high voltage or high temperature components.
6. Keep wires in their original positions so as to minimize interference.
7. Always connect a test instrument's ground lead to the instrument chassis ground before connecting the positive lead; always remove the instrument's ground lead last.

> After putting the rear cover back and make sure the monitor is working properly, the Hi-Pot & Ground Continuity tests MUST BE performed before the monitor is returned to user.

1-3 Hi-Pot Test

1. Test Equipment

   Puncture test model PM5530 ADT or KIKUSU TOS-8750 voltage tester or equivalent approved equipment.

Note : The test equipment must be calibrated in regular period.

2. Test Setup
   a) Apply voltage : DC 2100 VDC
   b) Test duration : 3 seconds
   c) Cutoff current should be set to 3 mA
3. Test Procedure
   a) Unplug power cord from AC source.
   b) Put the power switch of the monitor in the "ON" position.
   c) Leave signal cable un-connected.

d) Plug monitor power cord to the Hi Pot tester terminals.

e) Turn on tester and watch the indicator or beeper.

f) If the indicator lamp lighten, or beeper beeps, the test fails.

1-4 Ground Continuity Test

1. Test Equipment

AC low ohm tester TOS-6100 or equivalent approved equipment.

Note : The test equipment must be calibrated in regular period.

2. Test Setup

a) Test duration : 3 seconds

b) Set current limit at 25 A

c) The grounding resistance must be less than 0.1 ohm.

3. Test Procedure

a) Plug the monitor power cord to the tester terminals.

b) Make sure all connections are well-contacted.

c) Turn on monitor power and tester power.

d) Press "Test" button.

e) If green light shows up, means test OK.
If red light shows up, means test fails.

f) If the Tester has a digital display, the resistance value must not exceed 0.1 ohm.

Note : Be sure not to touch the metal portion of the signal cable head during testing.

2 Product Specifications

2-1 Specifications

Picture Tube	17-inch (15.8-inch Visual image area), sloted mask, 90 degrees deflection, dot type black matrix, medium short persistence phosphor, dark tint, non-glare/ anti-static screen, 0.27 mm dot pitch
Scanning Frequency	VGA, Super VGA, 1024x768@60/70/75/85 Hz, 1280x1024@60 Hz
Maximum Resolution	1280 dots (H) x 1024 lines (V) @60Hz refresh rate
Display Area	300 mm (H) x 225 mm (V) typical
Display Characters	80 char. x 60 rows on a 10 x 10 matrix
Display Colors Analog Input	Unlimited Colors
Synchronizatin Signals	Separate Sync: horizontal/vertical, TTL, positive or negative
Synchronization Frequencies	Horizontal : 30 to 69 kHz Vertical : 55 to 120 Hz
Signal Connectors	15-pin, D-shell connector
Video Signals	Analog : 0.7 Vp-p, RGB positive
Power Input	95 Watts (maximum) AC rated voltage, 100VAC to 240VAC
Misconvergence	Center Area : $\leq$ 0.3 mm; Corner Area : $\leq$ 0.4mm
User Controls	Power On/Off, Contrast, Brightness, Horizontal Size, Horizontal Position, Vertical Size, Vertical Position, Pincushion, Trapezoid, Rotation, Color temperature, Language, Display Frequency, Degauss, Recall, H. Moire, V. Moire
Service Controls	PWB-1410 : R-bias (VR910), G-bias (VR940), B-bias (VR970), PWB-1440 : power voltage adjust (VR801), high voltage adjust (VR802), focus1, focus2
Preset Modes	13 (see Table 2-2. Timing Chart)
Environmental Considerations	Operation temperature : 5°C to 40°C ambient Operation Humidity : 20% to 80% ambient Storage temperature : -40°C to 65°C ambient Storage Humidity : 5% to 95% (non-condensing) Altitude : up to3000m above sea level

Note: Above specifications are subject to change without prior notice.

2-2 Signal Cable Pin Connections

Table 2-1. Signal Cable Pin Assignments

Pin	Signal	Pin	Signal
1	Red video	9	NC
2	Green video	10	Digital Ground
3	Blue video	11	Ground
4	Ground	12	SDA
5	NC	13	H-Sync
6	Red ground	14	V-Sync/VCL
7	Green ground	15	SCL
8	Blue ground		

Note: This pin is used for selftest detection. Connect this pin to ground at the PC end.

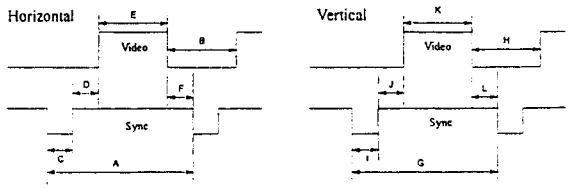
2-3 Timing Chart

This section describes the timings that the computer industry recognizes as standard for computer-generated video signals.

Table 2-2. Timing Chart

Mode	1	2	3	4	5	6	7	8	9	10	11	12	13
H. Dots	720	640	640	800	640	640	800	1024	800	1024	1024	1280	1024
V. Dots	400	480	480	600	480	480	600	768	600	768	768	1024	768
H-freq (kHz)	31.47	31.47	35	37.88	37.5	43.3	46.8	48.36	53.67	56.48	60.02	64.34	68.68
Sync Polarity	-	-	-	+	-	-	+	+	+	+	+	+	+
A period us	31.78	31.78	28.57	26.4	26.666	23.111	21.333	20.68	18.63	17.71	16.66	15.55	14.56
B Blking us	6.356	6.356	7.407	6.4	6.35	5.33	5.172	4.923	4.409	4.053	3.657	3.589	3.725
C Sync us	3.81	3.81	2.116	3.2	2.07	1.556	1.616	2.092	1.138	1.813	1.219	0.972	1.016
D B.P. us	1.907	1.907	3.175	2.2	3.81	2.222	3.232	2.462	2.702	1.92	2.235	2.248	2.201
E Active us	25.42	25.42	21.164	20	20.32	17.77-8	16.162	15.75	14.22	13.65	13	11.96	10.83-6
F F.P. us	0.636	0.636	2.116	1	0.51	1.556	0.323	0.369	0.569	0.32	0.203	0.374	0.508
V-freq (Hz)	70.08	59.95	66.667	60.32	75	85	75	60	85	70.07	75.03	60	85
Sync Polarity	+	-	-	+	-	-	+	+	+	+	+	+	+
O Period ms	14.27	16.68	15	16.58	13.33	11.764	13.333	16.67	11.76	14.27	13.33	16.67	11.77
P Blking ms	1.557	1.43	1.286	0.739	0.533	0.67	0.533	0.786	0.578	0.673	0.533	0.642	0.582
Q Sync ms	0.064	0.064	0.086	0.106	0.08	0.069	0.064	0.124	0.056	0.106	0.05	0.047	0.044
R B.P. us	1.08	1.02	1.14	0.607	0.407	0.578	0.448	0.6	0.503	0.513	0.466	0.501	0.524
S Active us	12.71	15.25	13.714	15.84	12.8	11.093	12.8	15.88	11.18	13.6	12.8	16.03	11.18
T F.P. us	0.413	0.35	0.086	0.026	0.026	0.023	0.021	0.062	0.019	0.053	0.017	0.094	0.015

Seperate Sync



H.Parameters:

A: Period B: Blanking Time
C: Sync Width D: Back Porch
E: Active Time F: Front Porch

V.Parameters:

G: Period H: Blanking Time
I: Sync Width J: Back Porch
K: Active Time L: Front Porch

2-4 Display Power Management Signal (DPMS)

Note: These power-saving states exceed the Environmental Protection Agency (EPA) Energy Star requirements and the Video Electronics Standard Association (VESA) for Display Power Management Signal (DPMS).

Table 2-3. Display Power Management Signal (DPMS)

State	LED Color	H-Sync	V-Sync	Power Consumption
ON	Green	Pulse	Pulse	Normal
STANDBY	Yellow	No Pulse	Pulse	<15 watts
SUSPEND	Yellow	Pulse	No Pulse	<15 watts
OFF	Amber	No Pulse	No Pulse	<8 watts

2-6 TCO Version (Optional)

The monitor meets the TCO 92, NUTEK energy saving, electric and magnetic field requirements. Also it is compliant with TCO 95 (optional) labelling scheme.

2-6-1 TCO 92 Version

The emission from magnetic and electric field must comply with the limits specified by the Swedish Board for Measurement and Testing, commonly known as MPR 1990 recommendations. These limits are summarized in the Table 2-4.

Table 2-4. TCO 92 Requirements

	VLF/TCO	ELF/TCO
Magnetic Field	25 nT	200 nT
Electric Field	1 V/m	10 V/m
Frequency Range	2~400 kHz	5~2000 Hz
Value	RMS	RMS
Distance	30 cm	30 cm
Electrostatic Potential	+/- 500 V	+/- 500 V

The monitor is designed with selected CRT and carefully routed wires around CRT, make sure exactly the same routing scheme is used for CRT replacement.

2-6-2 TCO 95 Version (Optional)

The TCO 95 scheme is for international and environmental labelling of personal computers. The labelling scheme was developed as a joint effort by the TCO (The Swedish Confederation of Professional Employees), Naturskyddsforeningen (The Swedish Society for Nature Conservation) and NUTEK (The National Board for Industry and Technical Development in Sweden).

1) Scope

TCO 95 touches on ergonomic qualities, emissions (electrical and magnetic fields), energy efficiency and ecology (with demands for environmental adaptation for both the product and the production processes at the manufacturing plant).

2) Environmental Requirements

The monitor abides by the environmental demands concerning restrictions on the presence and use of heavy metals, brominated and chlorinated flame retardants, CFCs (freons), and chlorinated solvents, among other things. The monitor is also recyclable.

3) Energy Requirements

The monitor also follows the energy requirements that, after a certain period of inactivity, the monitor shall reduce its power consumption to a lower level in one or more stages.

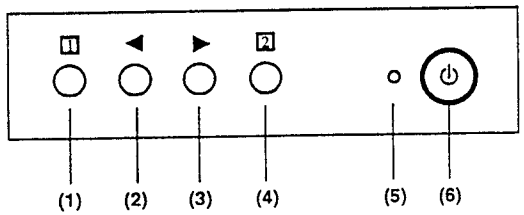
4) Others

The monitor meets the strict environmental demands for the reduction of electric and magnetic fields, physical and visual ergonomics and good usability.

Table 2-5. TCO 95 Visual Ergonomics

Feature	Standard	Description
Linearity	1% or less	Difference in length of columns or rows compared to the corresponding lengths through the center of the monitor.
Display Luminance	100 cd/m2 (at least)	
Luminance Uniformity	1.7:1 or less	The ratio is between the max to min luminance within the whole active area.

3 Control Location and Functions



(1) Function Key
(2) Decrease Key
(3) Increase Key
(4) Select Key
(5) Power LED
(6) Power ON/OFF

3-1 Front Panel

3-2 Front Panel Keys Functions

1. Function Key: Display the main menu, and exit the adjustment screen and save adjustments.
2. Decrease Key: Scroll across main menu, highlighting control to be adjusted. Decrease value of selected control. Toggle between Contrast and Brightness adjustment screens.
3. Increase Key: Scroll across main menu, highlighting control to be adjusted. Increase value of selected control. Toggle between Contrast and Brightness adjustment screens.
4. Select Key: Press once to display adjustment screen. Press again, for some controls, to toggle between controls shown in pairs on main menu.
5. Power LED: Display different modes (ON, standby, suspend or OFF) of the monitor by showing different color for each mode.
6. Power ON/OFF: To turn the monitor ON and OFF.

3-3 Adjustment Procedure

1. Press (6) key to turn on the monitor.
2. At normal condition, press (1)on the front panel to activate the on-screen manager (OSM) menu. But to enter the internal adjustment menu, keep pressing (1) & (4) key simultaneously and then press (6) key.
3. To select a user control, press (2) or (3) key repeatedly until the control is highlighted.
4. To adjust the value for particular control, press (4), then press the (2) or (3) key to obtain the desired value. There are a few parameters that do not require any adjustment, like Manual Degauss, Memory Recall.
5. Some controls are grouped in pairs on the main menu. Press (4) key to toggle between them.
6. To save your adjustments and exit screen, press (1) key. The menu will automatically clear out from the screen if no keys are pressed within 30 seconds.

4 Operation Theory

This is a fully digital controlled multi-sync color monitor that is compliant with DDC1 and 2B Plug and Play VESA standard and offers the following main features.

4-1 Main Features

1. Simplified design with minimum components.
2. The NOVATEK NT68P61A processor-- that has I²C BUS controlled geometric correction, contrast and brightness-- offers the functions for: (a) Contrast, (b) Brightness, (c) H-size, (d) H-position, (e) V-size, (f) V-position, (g) Pincushion, and (h) Trapezoid.

   In addition, it also offers more functions as: (a) Sync. processor, I/P and O/P, (b) Mute, (c) Power saving - Suspend & Stand-By, (d) Power saving override, (e) DDC1/2B, (f) I²C Bus for auto-alignment through signal cable (g) CS1/CS2/CS3/CS4 for linearity and size compensation.
3. Stores up to 14 factory preset modes and offers 8 user modes. There are 16 function icons at OSD. They are controlled by 1 ◄ ► 2 keys on front panel.
4. Powerful PHILIPS TDA4854 and TDA4866 present the following useful functions: (a) Pincushion, (b) Trapezoid, (c) V-Position, (d) V-Size, (e) Vertical's "C" and "S" correction -- factory adjust, (f) Pincushion's V. position correction, (g) Corner correction -- factory adjust, (h) Pincushion unbalance correction -- factory adjust, (i) Parallelogram distortion -- factory adjust, (j) Moire cancellation -- factory adjust, (k) X-ray protection, and (l) Full horizontal and vertical auto sync capability.
5. Software controlled auto shut off function activated if fH < = 29 kHz and fH > = 70 kHz.
6. Full range AC input and simplified line filter design.

4-2 Microcontrol Section

1. This monitor uses NOVATEK NT68P61 CPU. It contains a 6502 8-bit CPU core, 256 bytes of RAM used as working RAM and stack area, 24k bytes of OTP ROM, 14-channel 8 bit PWM D/A converter, 2-channel A/D converters for key detection saving I/O pins, internal H. sync and V. sync signals processor providing mode detection, and an I²C bus interface. When H/V sync through D-Sub signal cable enter pin 39 and pin 40, the CPU performs frequency / polarity detection and calculate and send to H/V sync OUT. Then CPU reads the data from I703 and transfer to device 4854 and some DAC in CPU, above operation takes about 500 ms.
2. There allowed 14 factory preset modes and 8 user modes. There are 8 functions, Contrast, Brightness, H. Size, H. Position, V. Size, V. Position, Pincushion, and Trapezoid, all controlled by OSD icon which can be adjusted by user.
3. The pin 24 and pin 25 are used for ATE function. When CPU receives C6 as slave address, it will operate in ATE mode which is used for auto-alignment. After alignment the data will be stored in I703.
4. The user control parameters are selected by OSD icons, through 1 ◄ ► 2 keys, they are detected by sensing the voltage through R710, R740, R711, R743, R741, R711 to pin 13 and 14 of I701.

4-3 Deflection Section

1. I²C -- autosync deflection controller is TDA4854.
2. The TDA4854 is a high performance and efficient solution for autosync monitors. All functions are controllable by I²C bus. SDA and SCL signals come from microprocessor feed to pin 19 and pin 18 to control all functions.

4-3-1 Horizontal Section

1. The oscillator is driven by the currents in R419 and R420. The minimum oscillator frequency is determined by R419 and the maximum frequency is determined by R420.
2. Horizontal sync comes into pin 15 through R318. And horizontal flyback pulse comes into pin 1 through R401 and by pass filter C403 from pin 9 of FBT and C453, R4C2, Q414, R4C3 for AFC loop.
3. Horizontal driver (pin8) O/P to Q401 via C410.

4-3-2 Vertical Section

1. Vertical sync comes into pin 14 through R317.
2. The free running frequency is determined by R301 and C301.

4-3-3 Vertical O/P section

1. The differential output currents from pin 13 of Vout1 and pin 12 of Vout2 can be directly coupled to the vertical deflection booster pin 1 and pin 2 of TDA4866.
2. The TDA4866 has two output stages which are current driven in opposite phase and operate in combination with the deflection coil in a full bridge configuration.
3. This IC is powered by two sets of positive voltage. (+12V at pin 3, +50V at pin 7).

4-3-4 E-W/Trapezoid and H. Width Controls

1. The horizontal O/P stage uses diode modulator D419, D423, C411, C412, L409 and C418 for East-West (Pincushion) Trapezoid and H. width controls.
2. The scan current is determined by B+ minus Vm (the voltage of C418) values and the pincushion control is accomplished by Darlington pair Q418 and Q419 by coupling a parabola waveform from pin 11 of TDA4854. The H. width / corner and trapezoid correction are also accomplished by this pin 11. The DC level controls H. size. The AC level is combined with side pin and trapezoid corners functions.

4-3-5 X-Ray Protection

1. To avoid X-ray hazard, a DC voltage generated by pin 6 of FBT and rectified by D408, C432 and divided by R403, R404 and R405 come into pin 2 of TDA4854.
2. If this voltage is higher than 6.39 V, then TDA4854 will be activated to float HUNLOCK (pin17), H. DRV(pin 8), B DRV (pin 6), VOUT1 (pin 12), VOUT2 (pin13). After that all deflection circuit stop working.

4-3-6 G1, Blanking and Brightness

1. The vertical blanking signal comes from two ways. One is from pin 8 of I301 (TDA4866), the other is from vertical sync (pin 32 of I701). These two positive vertical pulses through Q406 amplified and converted into negative pulse and sent to G1 for vertical blanking.
2. In protection mode or an out-of- range situation HUNLock will send 5 V pulse to saturate Q406 and to cutoff Q407, then G1 will go down to -140V. During the mode change, Mute acts as same as HUNLock's.
3. The brightness is controlled by CPU pin 1 through PNP transistor Q407. The lower control voltage causes Q407 conducts harder to get brighter raster and a higher control voltage causes Q407 conducts lighter to get lower brightness.

4-3-7 Contrast Section

1. Contrast is controlled by I701 through I²C bus to I501 (TDA4886) directly.
2. Beam current is detected through T402 (FBT) pin 7, C429, VR401, R460, and detected voltage feeding into R461, R4F1, Q410, R430, R469, R524 to control I501 pin 24 voltage. When I501 pin 24 voltage drops below 5V, the ABL function will happen.

4-3-8 H/V size breathing compensation

1. Beam current is sensed as above section (4-3-7 item 2) and this voltage routes through R458, C460, Q409, R436, R459, then through R418 to I401 pin 31 for H. size compensation, through R302 to I401 pin 21 for V size compensation.

4-3-9 Dynamic focus circuity

The dynamic focus is applied to improve the corner focus performance, it includes horizontal and vertical dynamic focus.

1. Horizontal and vertical dynamic comes from I401 pin 32 and amplified through C450, R499, Q431, Q404, Q403, R437 and feed to FBT dynamic focus pins.
2. This amplifier need 800V voltage supply, it comes from FBT pin 2 and rectified through R4C6, D422 and C448.

4-4 Power Supply Section

4-4-1 AC Rectifier

The circuit can accept 90 V to 264 V AC input through D801~D804 bridge diodes and C808 filtering to get DC 126 V~364 V for power conversion in T802.

4-4-2 Line Filter

It consists of C801, C802, C803, C816, C852, C853, C807 and T801 and meets EMI regulation.

4-4-3 Power LED Status

1. The LED has 3 leads with common cathode to emit green and amber color light for different power saving indications. It is controlled by CPU.
2. Normal : Green light

   Amber LED is off because CPU pin 35 is high and pin 34 is low, only green LED is turned on.
3. Standby / Suspend : Yellow light

   CPU pin 34 and pin 35 are low, then green and amber LED are turned on. That is yellow.
4. Off Mode : Amber light

   CPU pin 34 is high and pin 35 is low, then green is off and amber is illuminated.

4-4-4 Auto Degaussing

When S701 turns on, pin 19 of I701 will send a signal to Q802 and turns on RL801 for degaussing. After 4 seconds, it will turn off RL801 automatically.

4-4-5 PWM Control

1. Start Up

   The I801 (MC3842) gets power from R807, R873, C812 and pin 7 voltage reaches 16 V for starting up. The I801 starts oscillation at 22 kHz, sawtooth on pin 4 and pin 6 output to drive Q803/T802. Once Q803 switching on, D806, C804 set up an 15 V to keep I801 working through D808 auxiliary voltage.

2. Regulation

   The DC O/P voltage is proportional to the auxiliary voltage, so I801 pin 2 senses the feedback voltage from the divider R802, R823, VR801 and R821 to compare with the built-in 2.5 volts reference voltage for error amplifier operation. Finally pin 6 can modulate the different duty cycle by VR801 setting to achieve regulation purpose.

4-4-6 Synchronization

1. Normal Mode

   The sync pulse from FBT (31 kHz~69 kHz) via C815, R826, D824, C814 and R816 to pin 4 of I801 to keep I801 synchronized with horizontal sync input frequency.

2. Power Saving Modes: Standby/Suspend

   Because there is no pulse from FBT, so the free-run frequency is decided by R815 and C814 and the SMPS works at 22 kHz.

3. Override

   The horizontal free run frequency is about 62.5 kHz under override condition, SMPS is synchronized to this frequency.

4-4-7 O.V.P.

If the auxiliary voltage is higher than zener voltage ZD807 (18 volts) and makes pin 3 of I801 higher than 1 V, pin 6 duty cycle is limited to have the OVP activated.

4-4-8 O.P.P.

The excess current of T802 through R813, R865 and R864 can develop enough voltage on pin 3 then limit the power delivered because the pin 6 duty cycle is limited too.

4-4-9 Step Up Power Supply For FBT

1. The B+ of FBT is proportional to horizontal frequency, that is the higher frequency, the higher voltage. The basic voltage is 55 volts from T802 pin 3 via D840, L812 and the gate control of Q807 comes from I401 pin 6 via Q808, Q809 and D821. The duty cycle is controlled by C843, C462, R489, R846 and R856, R857, R858 VR802 combination ratio.
2. The regulation and boost up (from 68 V to 155 V or more, on demand). The H.V. is set at 25 kV (zero beam) by VR802 which senses the secondary O/P from FBT. The booster comprises Q807, L801, D820, C425 and I802 to offer the required B+ for different frequency modes.

4-5 Video Amplifier Section

1. RGB signal inputs are terminated by R501, R531 and R561 then pass through the coupling capacitors C503, C533 and C563 to the IC501 TDA 4886 preamplifier.
2. The amplifier RGB signals (0~3 Vpp) are adjusted by I²C bus from I501, pin 5 is for clamp pulse which comes from pin 16 of TDA4854 to set up the equal clamp level.
3. The video output stages are amplified by I901 (LM2407).
4. The RGB cathodes cut off are adjusted by VR910, VR940 and VR970.
5. Under override condition, "NO SIGNAL" will show on the screen.

4-6 OSD (On Screen Display) Circuit

1. The I502 HTV018-08 is OSD IC. The OSD signals are worked by positive vertical pulse from I701 pin 32 that goes through R517 to I502 pin 10, and positive horizontal pulse from T402 pin 9 goes through C453, R422, Q414, R4C3 to I502 pin 5. CPU I701 pin 26, 27 (I²C bus) transfers information to I502 pin 7, 8.
2. The OSD R. G. B signals and blanking signal are terminated at I502 pin 15,d 14, 13, and 12 to I501 pin 2, 3,4, and 1, then the OSD picture appears.

5 Alignments and Adjustments

This section of the service manual explains how to make permanent adjustments to the monitor settings.

5-1 General Adjustments

5-1-1 Adjustment Conditions

a) Power Supply

Apply AC 115 V or 220 V

b) Warm-up Time

The monitor must be powered on for 15 minutes before starting any alignment, but requires 30 minutes of warm-up time for convergence adjustment.

c) Signal Input

1. Video: RGB Analog, 0.7 Vp-p, positive
2. Synchronization: Horizontal and vertical TTL signal, separate, positive or negative
3. All adjustments should be made using a signal of FH = 31.468 kHz, FV = 60 Hz, unless otherwise defined. .

5-1-2 Equipment Required

The following equipments are necessary for adjustment procedures:

1. Volt-ohm-A meter (Sanwa FD-750C or equivalent)
2. 30 kV high voltage probe (HP34111A)
3. Oscilloscope (TEK2235 or equivalent)
4. Minolta Color Analyzer II
5. Signal generator (IBM PC with proper display cards or Chroma 2000)
6. Screwdriver

5-1-3 Switching Power Supply and Regulator Adjustment

a. The regulated B+ control has been preset in the factory and needs no adjustment. However, if any repair is made on the power supply section, the following readjustment procedures are recommended:

1. Allow the monitor to warm-up for about 15 minutes.
2. Apply XGA (1024 x 768 @ 68 kHz/85 Hz) signal to the monitor.
3. Connect a DC voltage meter to D814 "-" (on the control PCB), and adjust VR801 for 12.8 0.2 V DC
4. If a fuse is broken during adjustment, remember to replace it with the exact same type of fuse.

b. If necessary, follow the following procedures to enter the factory mode.

1. *Short ATE pin to GND wire and put COM wire short COM and ATE 1 at power off condition.*
2. Press both [1] key and [2] key simultaneously then power on.
   Now, we are in the factory preset mode.
3. When turns the power off, this monitor will go back to normal mode (user mode).
4. When finish the normal alignment. Open ATE pin and change GND wire to GND 1, put COM wire to short COM and DDC.

5-2 Alignment Procedures

5-2-1 High Voltage Adjustment

CONDITION

Display image : Crosshatch pattern

PROCEDURE

Connect DC meter to TP3 and adjust VR802 to obtain a DC voltage of 152 ± 1V DC for CPT CRT M41AGE 93x46C or M41AGE83x46C.

NST NSL

5-2-2 Screen and White Balance Adjustment

CONDITION

Press [1] and [2] buttons simultaneously when switching the power "On".

Bias VRs : VR910, VR940, VR970

Display image : No video

PROCEDURE

1 Raster color setting

1-a. Set brightness (OSD Icon) to -30 V at G1 and 600 V at G2.

1-b Adjust VR910, VR940 and VR970 to maximum.

1-c Adjust VR940 to Y=0.9 ± 0.2 FL.

1-d Adjust VR910 to get x=280 ± 5 and VR970 to get y=280 ± 5

1-e Adjust brightness to raster just distinguish.

CONDITION

Display image : 50 mm x 50 mm white block pattern

PROCEDURE

2 6500°K color temperature setting

2-a. Set brightness to cutoff and contrast to maximum.

2-b Move cursor on OSD to choose color temperature icon.

2-c. Press [2] key to G gain then adjust G gain = 68 value, then adjust B, R to y=329±5, x=313±5.

2-d Adjust contrast to set y=40±2FL

2-e Check x=313±5, y=329±5.

3 9300°K color temperature setting

3-a. Set brightness to cutoff and contrast to maximum.

3-b Move cursor on OSD to choose color temperature icon.

3-c. Press [2] key to G gain then adjust G gain = 71 value, then adjust B, R to y=311±5, x=281±5.

3-d Adjust contrast to set y=40±2FL

3-e Check x=281±5, y=311±5.

4 Full white ABL setting

CONDITION

Display image : full white pattern

4-a Set brightness to cutoff and contrast to maximum.

4-b. Adjust VR 401 to y=28FL ±2FL.

4-c. Check the white balance at 5FL and 28FL.

4-d. Repeat all the procedures in 5-2-2 section until the best white balance is obtained, then power off.

5-2-3 Focus Adjustment

CONDITION

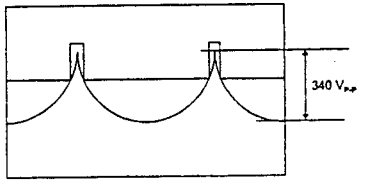
Display image : "e" character pattern

PROCEDURE

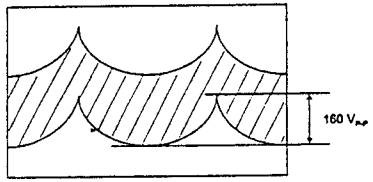
1. Set brightness to cutoff and contrast to maximum.
2. Adjust top VR at T402 (static focus VR) to make vertical line clear.
3. Adjust center VR at T402 (dynamic focus VR) to make horizontal line clear.
4. Repeat above procedures to get best focus.

5-2-4 Dynamic focus Adjustments

1. Horizontal dynamic focus set Hf=340V in phase (compare with video signal).



2. Vertical dynamic focus set Vf=160V in phase.



5-2-5 Static Convergence Adjustments

Static convergence involves alignment of the red, blue and green lines in the center area of the display.

Note : The monitor requires 30 minutes of warm-up time for convergence adjustment.

CONDITION

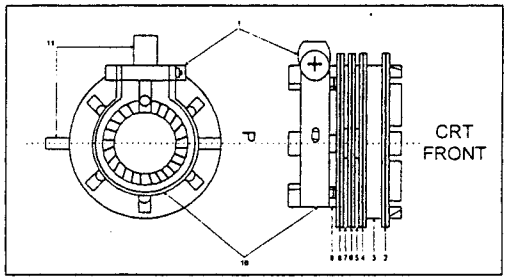
Display image : Crosshatch pattern

Warm-up Time : 30 minutes

PROCEDURE

1. Set brightness and contrast to display a well-defined pattern.
2. Ensure the convergence magnet rings are correctly positioned on the CRT.

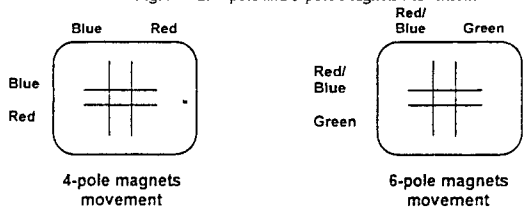
Figure 4-1. Convergence Magnets on the CRT



1) Setup Bolt	2) Bow Magnet	3) Band	4) 2-Pole Magnet
5) Spacer	6) 4-Pole Magnet	7) Spacer	8) 6-Pole Magnet
9) Holder	10) Band	11) Tabs	

3. Rotate the individual rings of 4-pole convergence magnets by changing the spacing between the 2 tabs to converge the vertical red and blue lines at the center of the screen.
4. Rotate the pair of rings of 4-pole convergence magnets by maintaining spacing between the 2 tabs to converge the horizontal red and blue lines at the center of the screen.
5. Rotate the individual rings of 6-pole convergence magnets by changing the spacing between the 2 tabs to converge the vertical red, blue and green lines.
6. Rotate the pair of rings of 6-pole convergence magnets by maintaining spacing between the 2 tabs to converge the horizontal red, blue and green lines.
7. Repeat the steps from 3~6 until the best convergence is obtained.

Figure 4-2. 4-pole and 6-pole Magnets Movement



Note : The 4-pole magnets and the 6-pole magnets interact, making dot movement complex.

5-2-6 Degaussing

Degaussing is required when poor color impurity appears on the screen. This monitor uses an automatic degaussing circuit that is activated when the power is on. The automatic degaussing will be fully functional again after the monitor has been in operation for 20 minutes.

The degaussing effect is confined to the picture tube since the coils are mounted at the back of the tube. Should any part of the chassis or cabinet becomes magnetized, it is necessary to degauss the affected area with a manual degaussing coil.

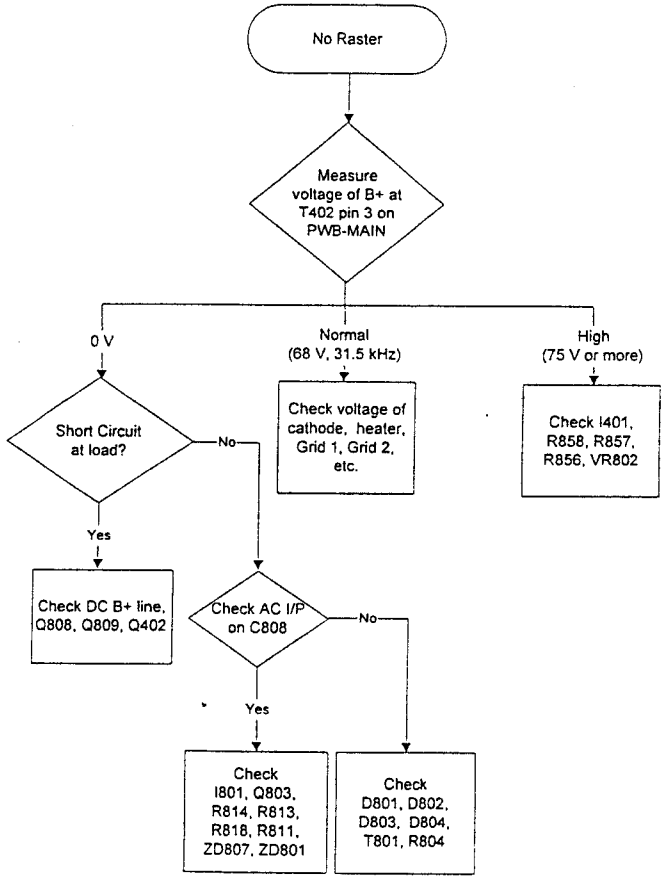
5-2-7 Manual Degaussing

1. Apply line voltage to the degaussing coil and move it in a rotary motion over the front, sides, and top of the monitor. The coil should be kept away from the rear of the monitor to avoid damaging the magnetic neck components.
2. Slowly rotate and move the coil away from the monitor to about 6 feet beyond the point where no effect on the CRT will be noticeable.

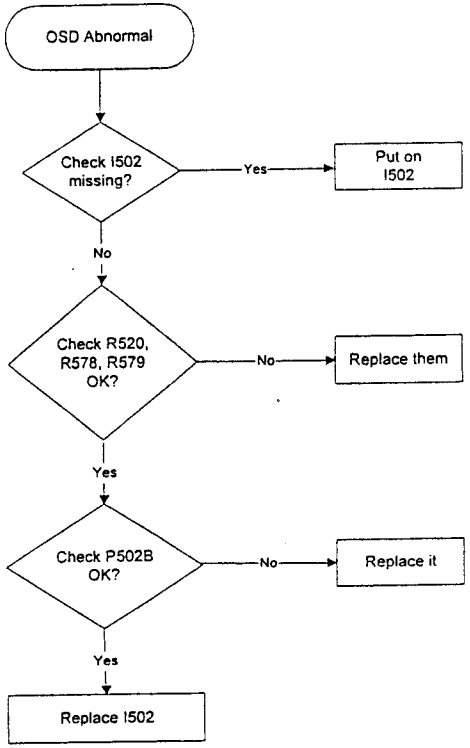
For proper degaussing, it is essential that the field be gradually reduced by moving the coil slowly away from the monitor. The degaussing coil must never be shut off or disconnected while near the monitor, as this would introduce a strong field instead of canceling the effect of the stray fields.

6 Troubleshooting

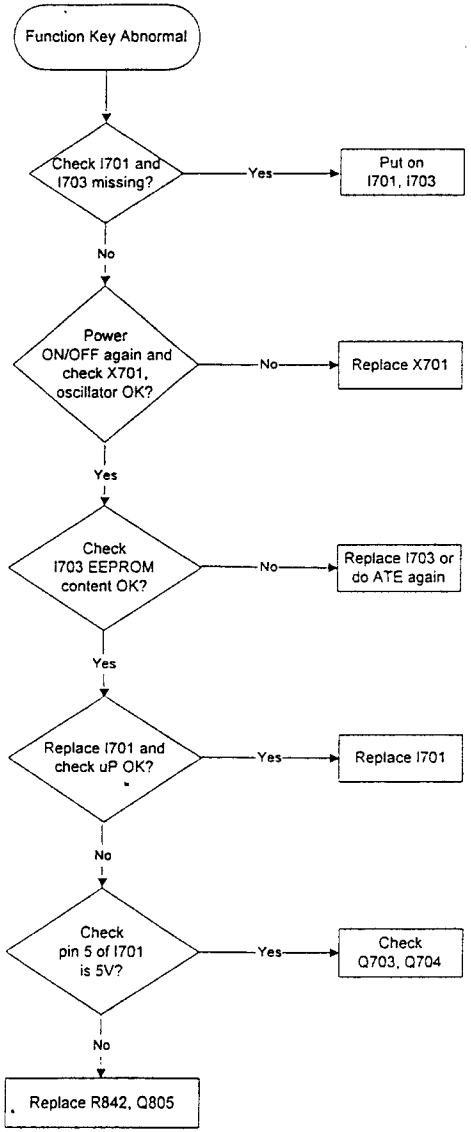
6-1 No Raster


No Raster
Measure voltage of B+ at T402 pin 3 on PWB-MAIN
0 V
Normal (68 V, 31.5 kHz)
High (75 V or more)
Short Circuit at load?
No
Yes
Check voltage of cathode, heater, Grid 1, Grid 2, etc.
Check I401, R858, R857, R856, VR802
Check DC B+ line, Q808, Q809, Q402
Check AC I/P on C808
No
Yes
Check I801, Q803, R814, R813, R818, R811, ZD807, ZD801
Check D801, D802, D803, D804, T801, R804

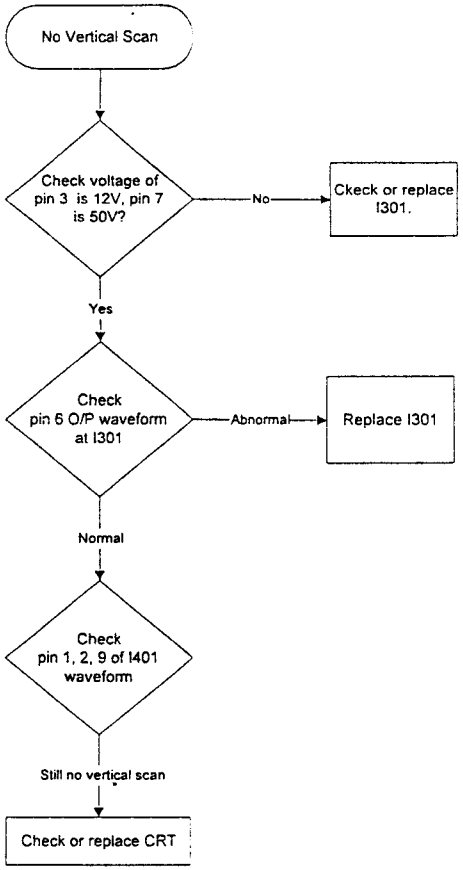
6-2 OSD Abnormal



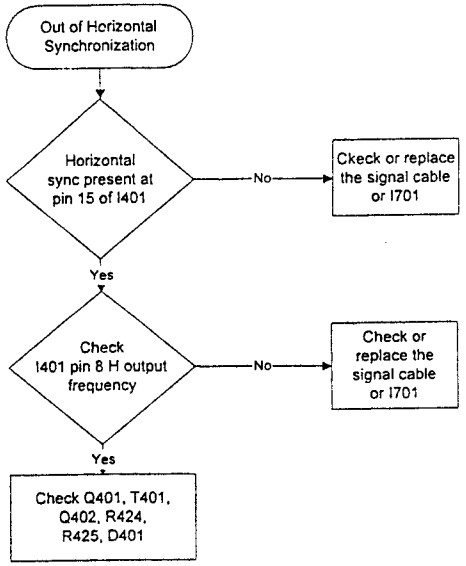
6-3 Function Key Abnormal



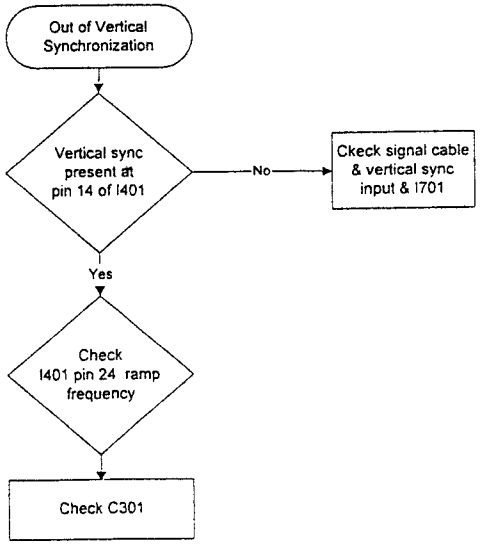
6-4 No Vertical Scan (Raster is one horizontal line)



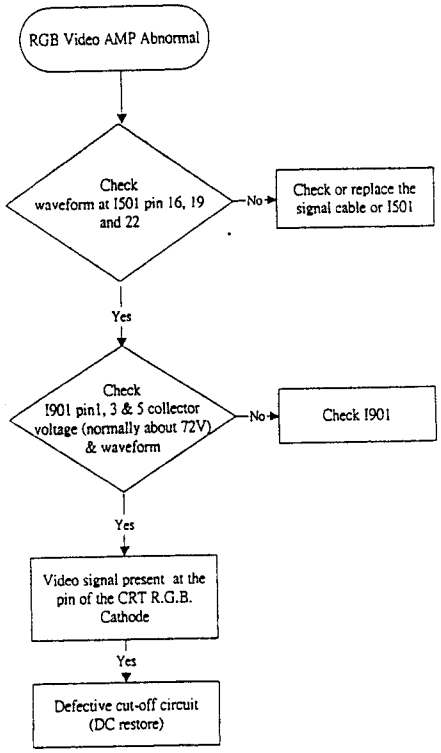
6-5 Out of Horizontal Synchronization


Out of Horizontal Synchronization
Horizontal sync present at pin 15 of I401
No
Ckeck or replace the signal cable or I701
Yes
Check I401 pin 8 H output frequency
No
Check or replace the signal cable or I701
Yes
Check Q401, T401, Q402, R424, R425, D401

6-6 Out of Vertical Synchronization


Out of Vertical Synchronization
Vertical sync present at pin 14 of I401
No
Ckeck signal cable & vertical sync input & I701
Yes
Check I401 pin 24 ramp frequency
Check C301

6-7 R.G.B. Video Amplifier Abnormal


RGB Video AMP Abnormal
Check waveform at I501 pin 16, 19 and 22
No
Check or replace the signal cable or I501
Yes
Check I901 pin1, 3 & 5 collector voltage (normally about 72V) & waveform
No
Check I901
Yes
Video signal present at the pin of the CRT R.G.B. Cathode
Yes
Defective cut-off circuit (DC restore)

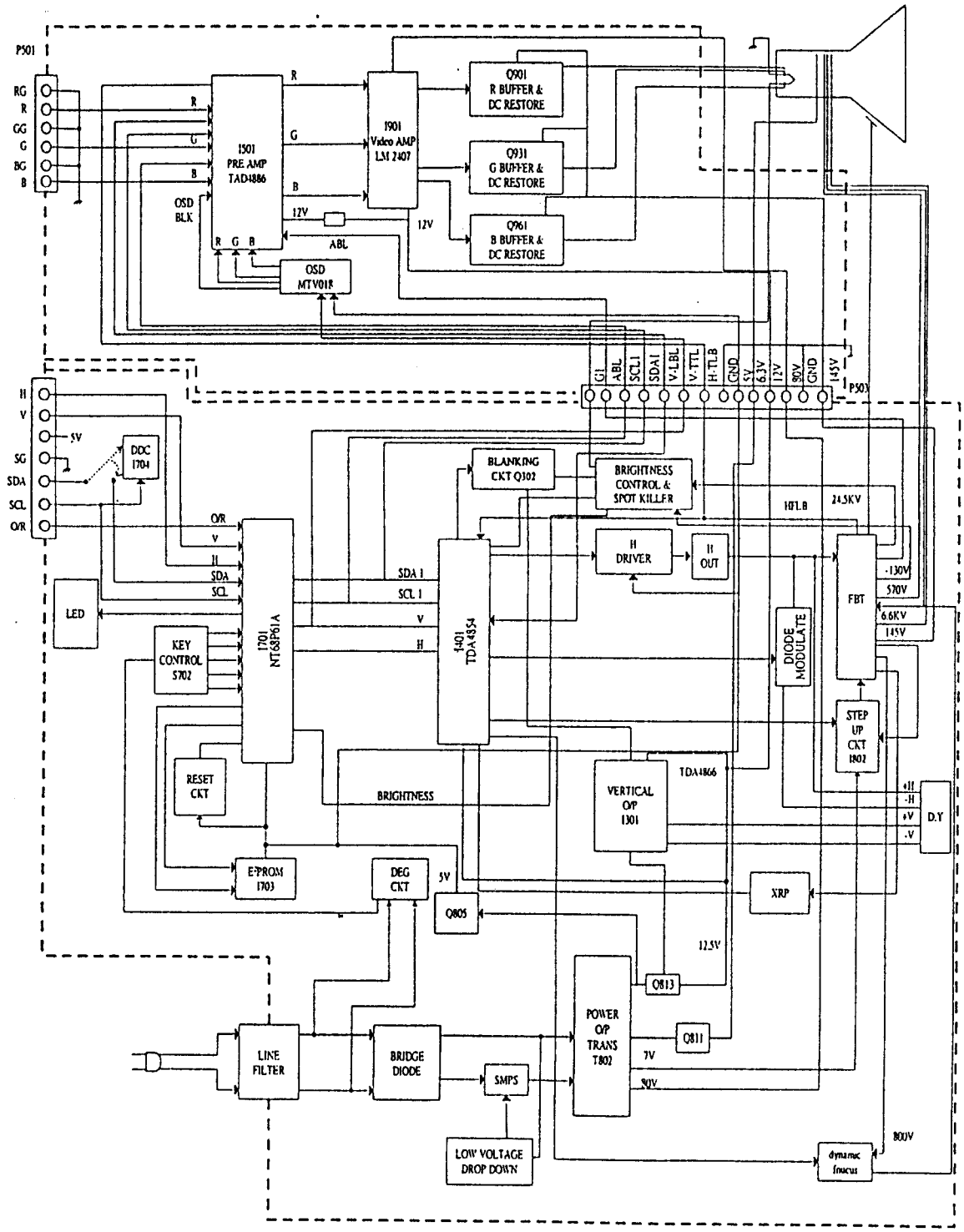
7 Recommended Parts List

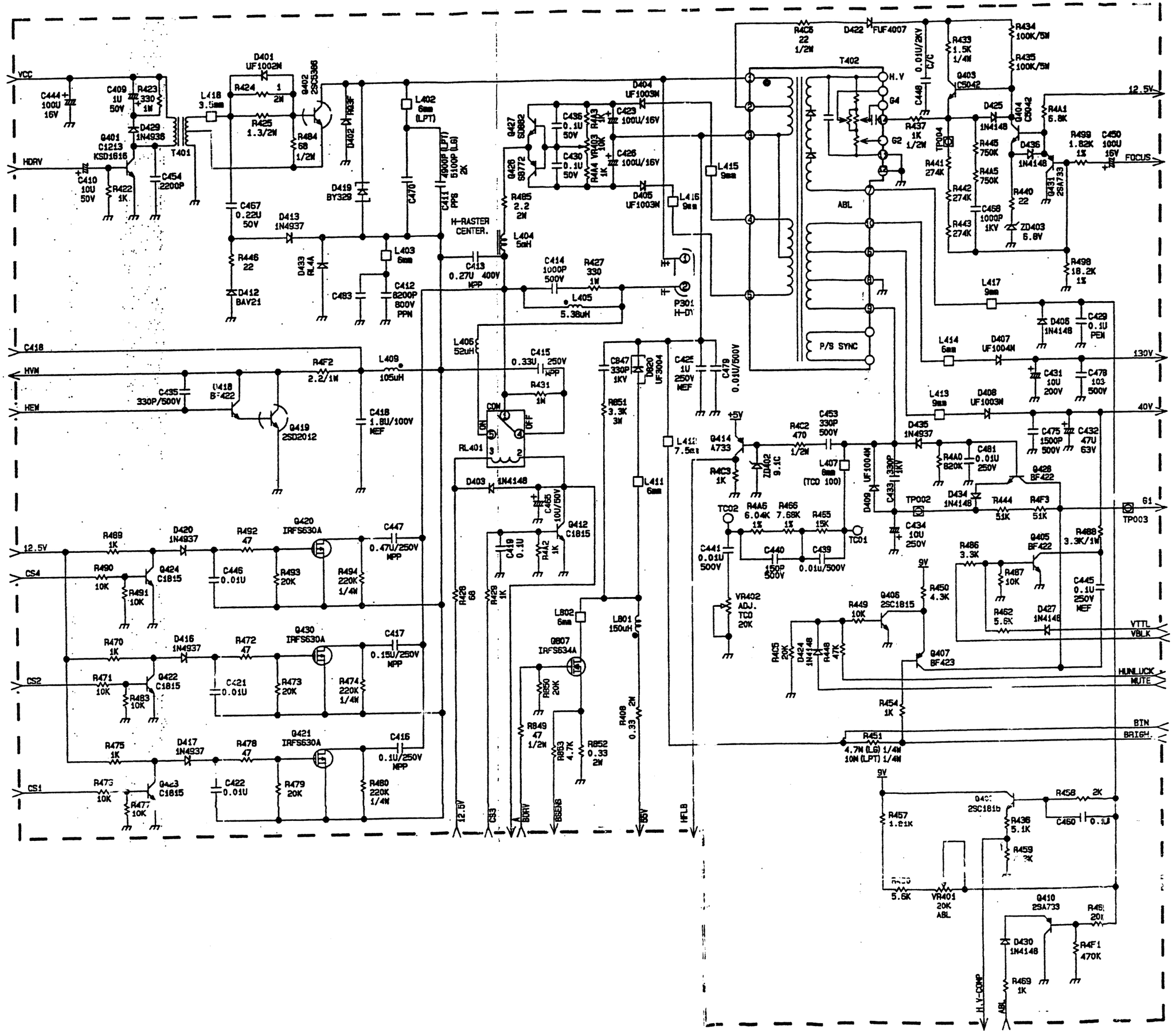
Note: The components identified by "⚠" mark are critical for X-ray safety. Replace these with only the same parts specified.

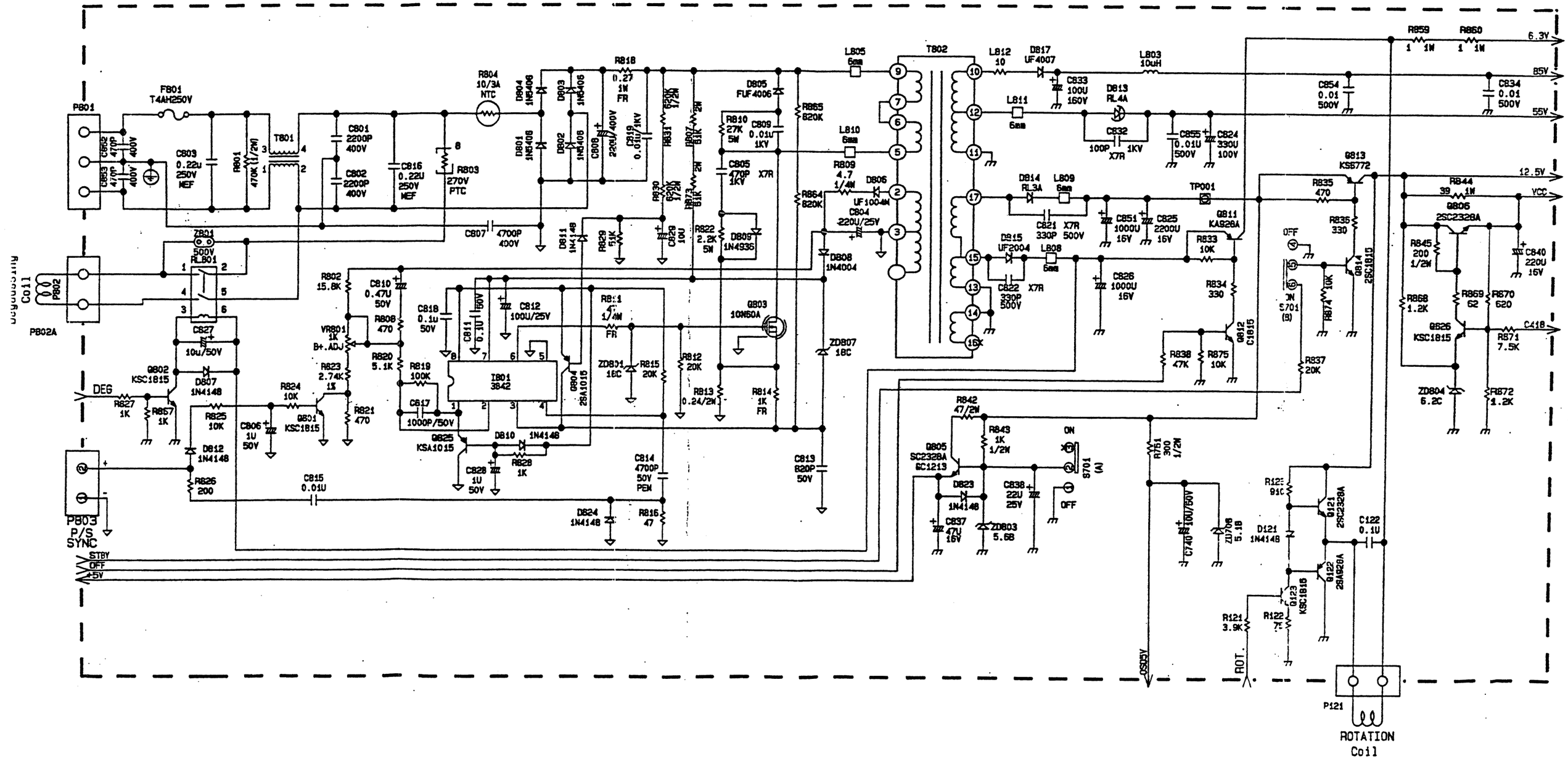
No.	Location	Part Number	Description
1	C417	6326215442	MPP uF 0.15 250V J F P=15 HJC
2	C808	6312622126	ALU uF 220 400V F 85C 25x40
3	D801 D802 D803 D804	6412011307	DIODE 1N5406 T52 3A/600V
4	D814	6412017900	DIODE RL3 3.5A/350V SANKEN
5	D815	6412004117	DIODE UF2004M T52 2A/400V 50nS
6	D820	6412002017	DIODE UF3004M T52 3A/400V 50nS
7 ⚠	F801	6851004050	FUSE TIME LAG 5ST4 4A/250V
8	I301	6442012300	IC TDA4866 9P (PHILIPS)
9	I401	6442020700	IC TDA4854 32P SDIP (PHILIPS)
10	I501	6442021500	IC TDA4886 24P SDIP (PHILIPS)
11	I701	6448012200	IC NT68P61A 40P PDIP OTP NOVAT
12	I703	6448007900	IC 24C04A/P (MICROCHIP)
13	I801	6442006020	IC UC3842BN 8P PDIP (ST)
14	L404	6111504130	COIL CHOKE 5mH K DR10x16 LY3B
15	L405	6119005200	COIL LINEAR TLN-1052
16	L406	6117686131	COIL CHOKE 68uH K DRWW10x16
17	L409	6111105131	COIL CHOKE L=105uH K DRWW16x18
18	Q402	6421004400	TR NPN 2SC5386 (TOSHIBA)
19	Q420 Q421	6426001800	FET N-CHNL IRFS630 TO-220F
20	Q430 Q807	6426006400	FET N-CHNL IRFS630A SAMSUNG
21	Q803	6426006800	FET N-CHNL SSS10N60A SAMSUNG
22 ⚠	R403	6224211024	MF KOHM 11 1/4W F T26
23 ⚠	R404	6224213024	MF KOHM 13 1/4W F T26

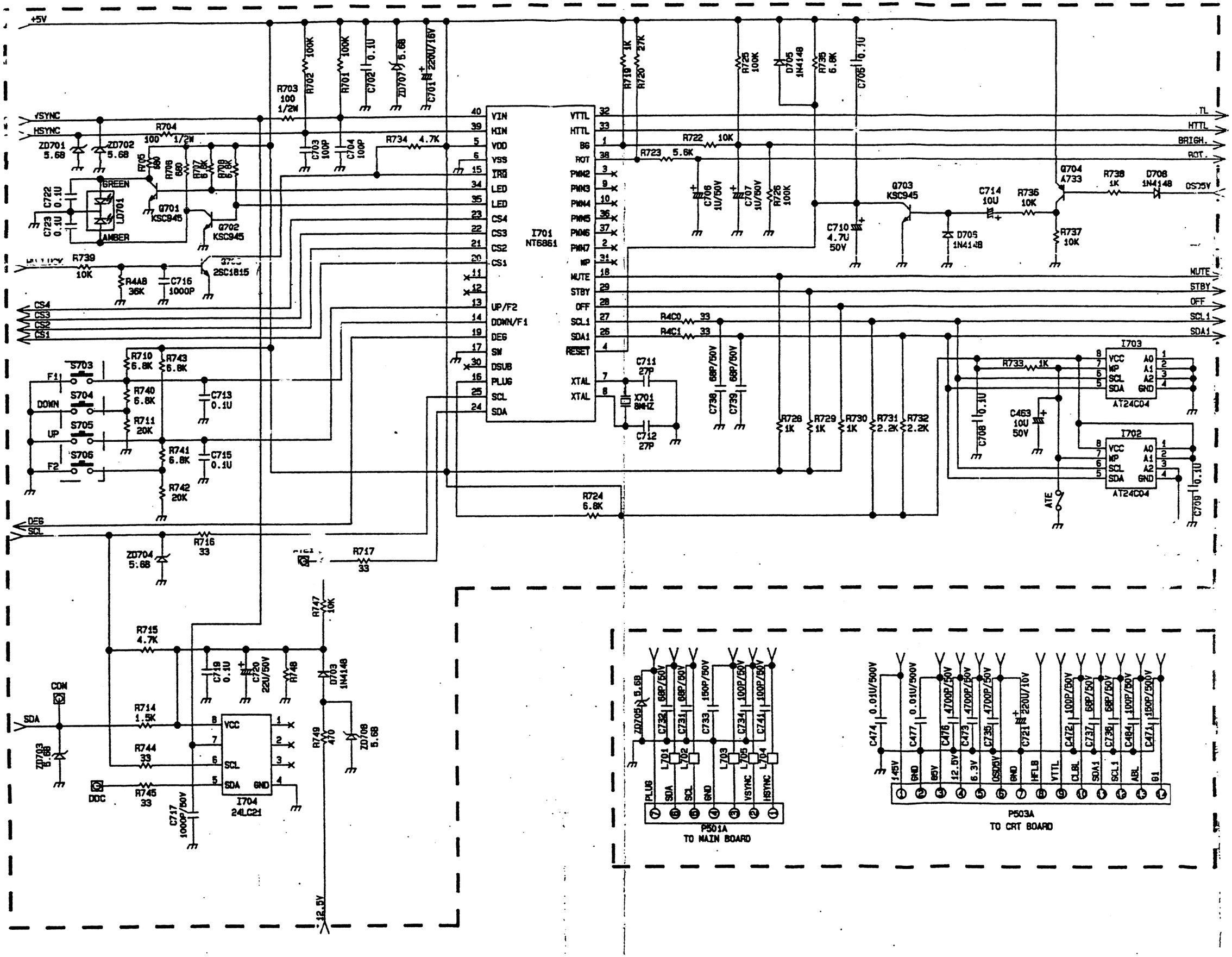
No.	Location	Part Number	Description
24 ⚠	R405	6224130114	MF KOHM 3.01 1/8W F T26
25	R803	6203090002	POSISTOR 9 OHM Q 2PINPITCH=10
26	R804	6201100012	THERMISTOR 10 OHM 3A P=7.5 TKS
27	R818	6220327852	FS OHM 0.27 1W J HOR
28	T401	6135000801	XFRMR HOR DRIVE THD-1008A EI19
29	T402	6133070020	FBT TFB-7002 FEA766 SAMPO
30	T801	6138001601	LINE FILTER TLF-1016A 16mHET28
31	T802	6131060700	XFRMER PWR TPW-1065 EE42/15DEI
32	X701	6449000710	CRYSTAL 8MHz TOP8.000 30pF TOP

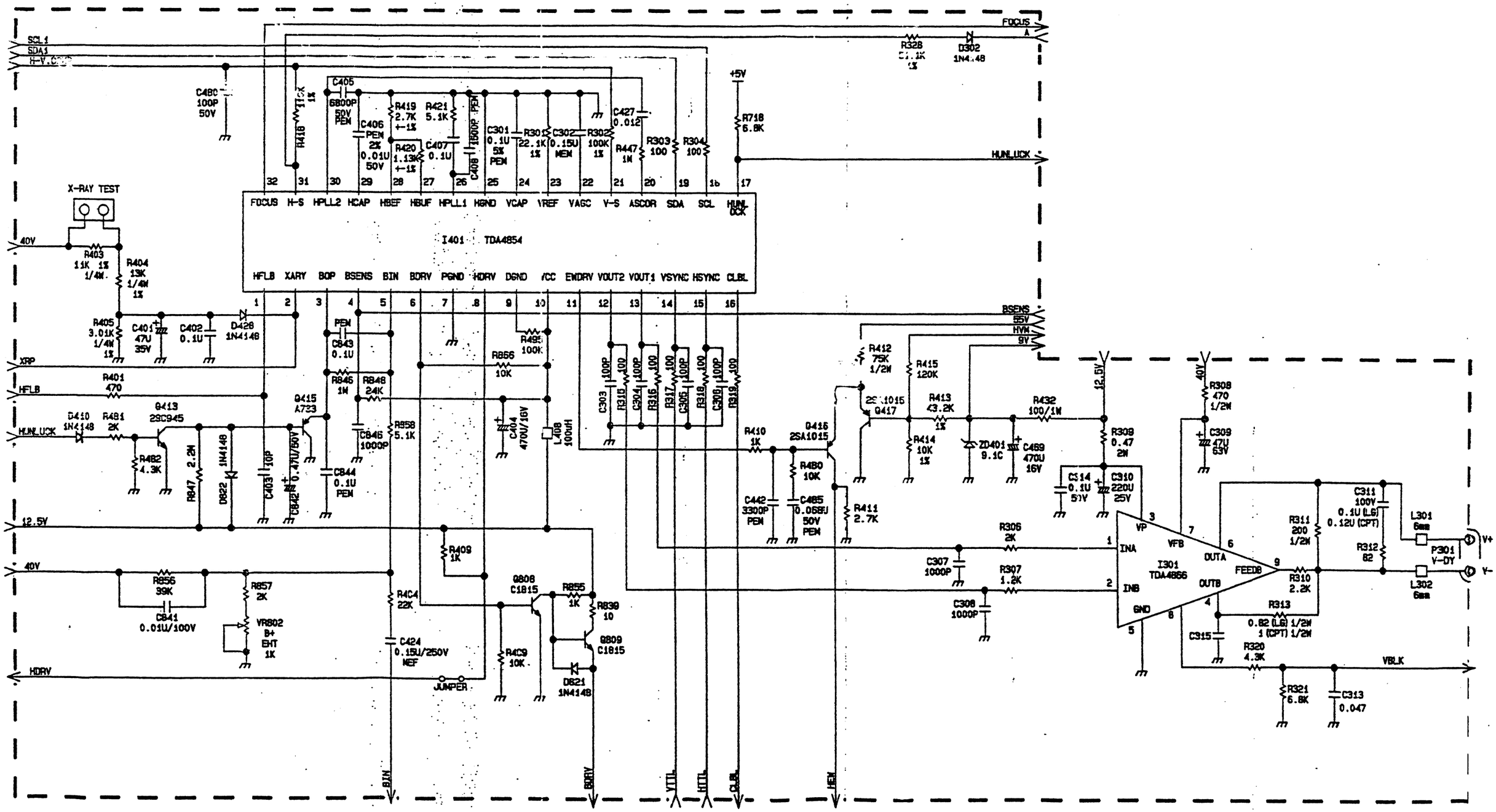
8 Block Diagram

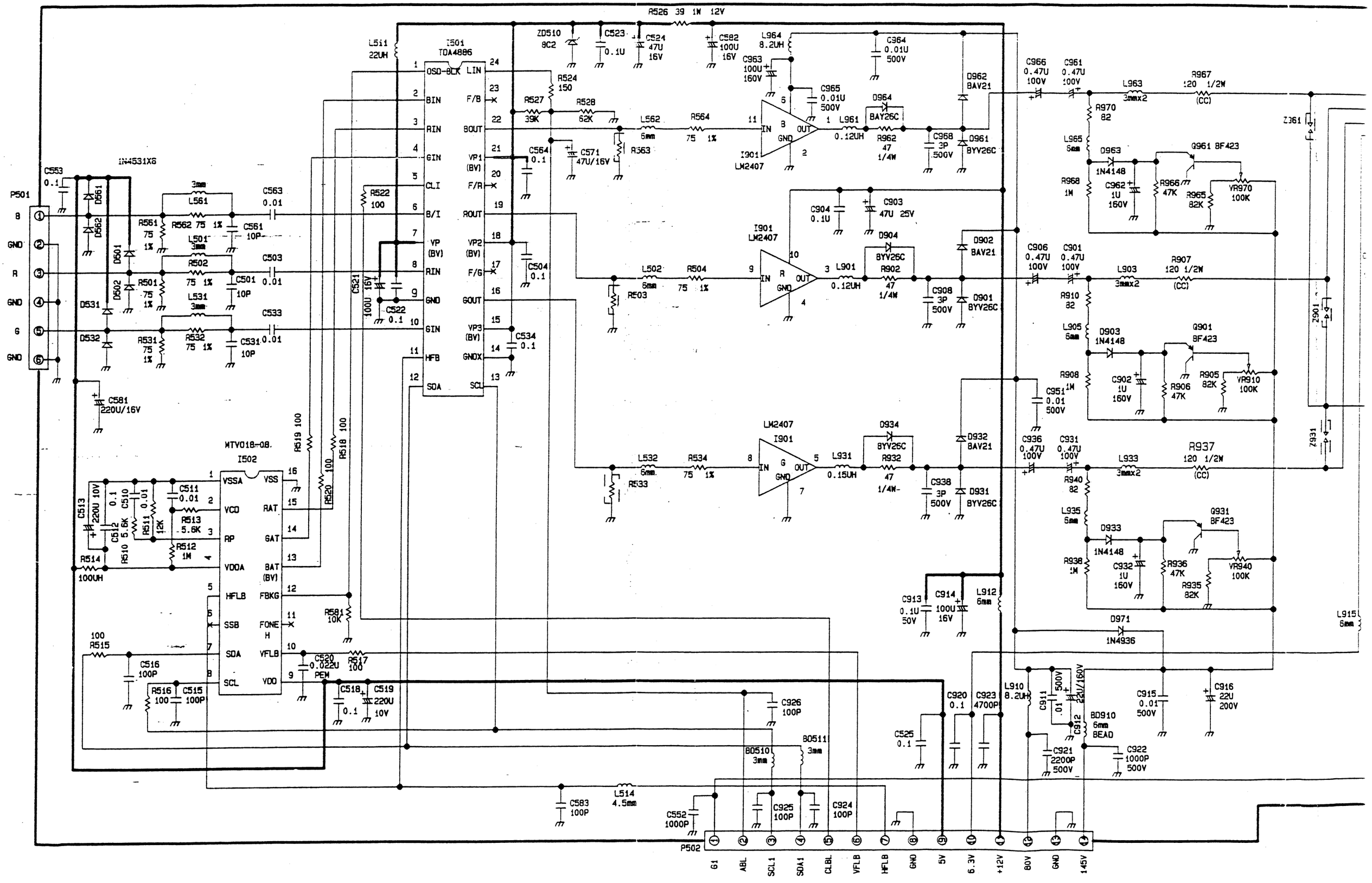


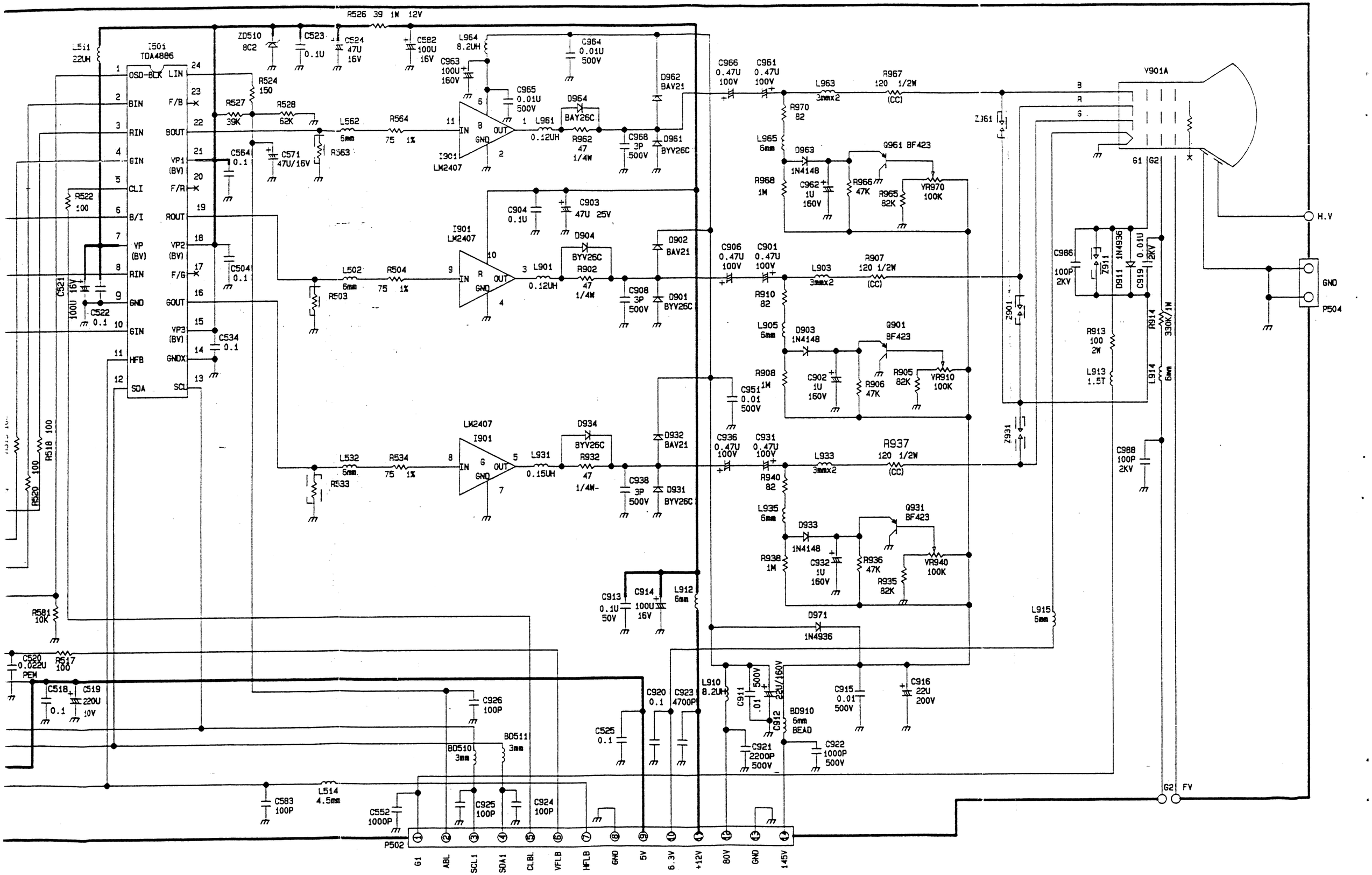

VCC
HDRV
C444 100U 16V
C409 1U 50V
R423 330 1W
D429 1N4936
Q401 C1213 KSD1616
C410 10U 50V
R422 1K
C454 2200P
T401
L418 3.5mm
D401 UF1002M
R424 1 2W
R425 1.3/2W
Q402 2SC5386
R484 68 1/2W
D402 RG3F
D419 BY329
L402 6mm (LPT)
C470
C411 4900P (LPT) 5100P (LG) PPS 2K
H-RASTER CENTER.
C457 0.22U 50V
D413 1N4937
R446 22
D412 BAV21
D433 RL4A
C483
L403 6mm
C412 8200P 800V PPN
L404 5mH
C413 0.27U 400V MPP
C414 1000P 500V
R427 330 1W
L405 5.38uH
L405 52uH
C415 0.33U 250V MPP
R431 1W
RL401
D403 1N4148
C465 100U/50V
Q412 C1815
C419 0.1U
R442 1K
R428 68
R429 1K
C53
B(RIV
B(ENS
L802 6mm
L801 150uH
Q807 IRFS634A
R850 20K
R849 47 1/2W
R853 4.7K
R852 0.33 2W
R408 0.33 2W
85V
HFLB
C418
HVN
HEM
C435 330P/500V
Q418 B-422
Q419 2SD2012
R4F2 2.2/1W
L409 105uH
C418 1.8U/100V MEF
R469 1K
D420 1N4937
R492 47
Q420 IRFS630A
C447 0.47U/250V MPP
12.5V
CS4
R490 10K
R491 10K
Q424 C1815
C446 0.01U
R493 20K
R494 220K 1/4W
R470 1K
D416 1N4937
R472 47
Q430 IRFS630A
C417 0.15U/250V MPP
CS2
R471 10K
R483 10K
Q422 C1815
C421 0.01U
R473 20K
R474 220K 1/4W
R475 1K
D417 1N4937
R478 47
Q421 IRFS630A
C416 0.1U/250V MPP
CS1
R473 10K
R477 10K
Q423 C1815
C422 0.01U
R479 20K
R480 220K 1/4W
D404 UF1003M
C423 100U/16V
C436 0.1U 50V
C430 0.1U 50V
R443 10K
R444 VR403 1K
C426 100U/16V
Q427 SD882
Q426 SB772
R485 2.2 2W
D405 UF1003M
L415 9mm
L416 9mm
T402
H.V
G4
G2
ABL
P/S SYNC
C448 0.01U/2KV C/C
R4C6 22 1/2W
D422 FUF4007
R433 1.5K 1/4W
Q403 1C5042
R434 100K/5W
R435 100K/5W
D425 1N4148
Q404 C5042
R4A1 6.8K
R437 1K 1/2W
TP004
R441 274K
R442 274K
R443 274K
R445 750K
R4A5 750K
C458 1000P 1KV
ZD403 6.8V
D436 1N4148
R439 1.82K 1%
C450 100U 16V
FOCUS
Q431 2SA733
R440 22
12.5V
R498 18.2K 1%
L417 9mm
L414 6mm
D407 UF1004M
D406 1N4148
C429 0.1U PEN
130V
C431 10U 200V
C478 103 500V
L413 9mm
D408 UF1003M
40V
C475 1500P 500V
C432 47U 63V
D435 1N4937
R4A0 820K
C481 0.01U 250V
Q428 BF422
D434 1N4148
R444 51K
R4F3 51K
G1
TP003
C847 330P 1KV
D820 UF3004
C425 1U 250V MEF
C479 0.01U/600V
R851 3.3K 3W
L411 7.5mm
L411 6mm
+5V
Q414 A733
R4C2 470 1/2W
C453 330P 500V
R4C3 1K
ZD402 9.1C
L407 6mm (TCO 100)
UF1004M
C433 330P 1KV
D409
TP002
C434 10U 250V
TC02
R4A6 6.04K 1%
R465 7.68K 1%
R455 15K
TC01
C441 0.01U 500V
C440 150P 500V
C439 0.01u/500V
VR402 ADJ. TCO 20K
9V
R450 4.3K
R449 10K
Q406 2SC1815
R435 20K
D424 1N4148
R448 47K
Q407 BF423
R486 3.3K
R487 10K
Q405 BF422
R488 3.3K/1W
C445 0.1U 250V MEF
R462 5.6K
D427 1N4148
VTTL
VBLK
HUNLUCK
MUTE
R454 1K
R451 4.7M (LG) 1/4W 10M (LPT) 1/4W
BIN
BRIGH.
R457 1.21K
Q409 2SC1815
R458 2K
C460 0.1U
R436 5.1K
R459 2K
5.6K
VR401 20K ABL
Q410 2SA733
R46[illegible] 20K
D430 1N4148
R4F1 470K
R469 1K
H.V-COMP
ABL


PB01
FB01
T4AH250V
C852 470P 400V
C853 470P 400V
C803 0.22u 250V MEF
R801 470K (1/2W)
T801
C801 2200P 400V
C802 2200P 400V
C816 0.22U 250V MEF
R803 270V PTC
R804 10/3A NTC
D804 1N5406
D803 1N5406
D801 1N5406
D802 1N5406
C806 220U/400V
C819 0.01U/1KV
R818 0.27 1W FR
R830 620K 1/2W
R831 620K 1/2W
R807 82K 2W
R873 82K 2W
D805 FUF4006
R865 820K
R864 820K
R810 27K 5W
C809 0.01U 1KV
C805 470P 1KV X7R
R809 4.7 1/4W
D806 UF100-4M
C804 220U/25V
D808 1N4004
ZD807 18C
L805 6mm
L810 6mm
T802
L812 10
D817 UF4007
L803 10uH
L811 6mm
C833 100U 160V
D813 RL4A
C832 100P X7R 1KV
C855 0.01U 500V
C824 330U 100V
C854 0.01 500V
C834 0.01 500V
R859 1 1W
R860 1 1W
6.3V
85V
55V
12.5V
VCC
Q813 KSS772
RB44 39 1W
Q806 2SC2328A
R835 470
R836 330
R845 200 1/2W
R868 1.2K
R869 62
R870 620
C840 220U 16V
Q826 KSC1815
R871 7.5K
C418
ZD804 6.2C
R872 1.2K
TP001
D814 RL3A
L809 6mm
C821 330P X7R 500V
C851 1000U 16V
C825 2200U 15V
Q811 KA928A
R833 10K
D815 UF2004
L808 6mm
C822 330P 500V
C826 1000U 16V
R834 330
Q812 C1815
R838 47K
R875 10K
R837 20K
OFF
ON
S701 (B)
R874 10K
Q814 2SC1815
R842 47/2W
R843 1K 1/2W
Q805 SC2328A GC1213
D823 1N4148
C838 22U 25V
C837 47U 16V
ZD803 5.6B
S701 (A)
OFF
R751 300 1/2W
C748 100U/50V
ZD706 5.1B
OSD5V
R123 910
Q121 2SC2328A
D121 1N4148
C122 0.1U
Q123 KSC1815
Q122 2SA928A
R121 3.9K
R122 75
ROT.
P121
ROTATION Coil
Q802 KSC1815
D807 1N4148
R827 1K
R857 1K
R825 10K
D812 1N4148
R826 200
PB03 P/S SYNC
STBY
OFF
+5V
DEG
R824 10K
Q801 KSC1815
R821 470
C806 1U 50V
C815 0.01U
R802 15.8K
C810 0.47U 50V
VR801 1K B+.ADJ
R808 470
R823 2.74K 1%
R820 5.1K
R819 100K
C817 1000P/50V
C818 0.1u 50V
C811 0.33U 50V
C812 100U/25V
IB01 3842
Q825 KSA1015
D810 1N4148
C828 1U 50V
R828 1K
C814 4700P 50V PEM
R816 47
D824 1N4148
C813 820P 50V
RB11 1/4W FR
Q804 2SA1015
Q803 10N60A
ZD801 18C
R815 20K
R812 20K
R813 0.24/2W
R814 1K FR
C807 4700P 400V
D811 1N4148
R829 51K
C829 10U
R822 2.2K 5W
D809 1N4936
PB02A
Primary Coil
PB02
ZB01 500V
RL801
C827 10u/50V


+5V
VSYNC
HSYNC
R703 100 1/2W
R702 100K
R701 100K
C702 0.1U
ZD707 5.6B
C701 220U/16V
R704 100 1/2W
ZD701 5.6B
ZD702 5.6B
R705 680
R706 680
R707 6.8K
R708 6.8K
GREEN
AMBER
LD701
C722 0.1U
C723 0.1U
Q701 KSC945
Q702 KSC945
C703 100P
C704 100P
R734 4.7K
R739 10K
R4A8 36K
C716 1000P
2SC1815
CS4
CS3
CS2
CS1
R710 6.8K
R743 6.8K
S703
F1
R740 6.8K
C713 0.1U
DOWN
S704
R711 20K
UP
S705
R741 6.8K
C715 0.1U
F2
S706
R742 20K
DEG
SCL
ZD704 5.6B
R716 33
R717 33
R715 4.7K
R747 10K
C719 0.1U
C720 220U/50V
R748
D703 1N4148
ZD708 5.6B
CON
SDA
R714 1.5K
R744 33
ZD703 5.6B
DDC
R745 33
C717 1000P/50V
I704 24LC21
12.5V
I701 NT6851
40 VIN
39 HIN
5 VDD
6 VSS
15 IRQ
34 LED
35 LED
23 CS4
22 CS3
21 CS2
20 CS1
13 UP/F2
14 DOWN/F1
19 DEG
17 SW
30 DSUB
16 PLUG
25 SCL
24 SDA
32 VTTL
33 HTTL
1 BG
38 ROT
3 PWM2
9 PWM3
10 PWM4
36 PWM5
37 PWM6
2 PWM7
31 NP
18 MUTE
29 STBY
28 OFF
27 SCL1
26 SDA1
4 RESET
7 XTAL
8 XTAL
R719 1K
R720 27K
R725 100K
D705 1N4148
R735 6.8K
C705 0.1U
R722 10K
R723 5.6K
C706 1U/50V
C707 1U/50V
R726 100K
C710 4.7U 50V
Q703 KSC945
D706 1N4148
C714 10U
R736 10K
Q704 A733
R738 1K
D708 1N4148
R737 10K
C711 27P
X701 8MHZ
C712 27P
R4C0 33
R4C1 33
C738 68P/50V
C739 68P/50V
R728 1K
R729 1K
R730 1K
R731 2.2K
R732 2.2K
R724 6.8K
TL
HTTL
BRIGH.
ROT.
MUTE
STBY
OFF
SCL1
SDA1
I703
R733 1K
C708 0.1U
C463 10U 50V
I702
AT24C04
ATE
C709 0.1U
P501A
TO MAIN BOARD
PLUG
SDA
SCL
GND
VSYNC
HSYNC
ZD705 5.6B
C732 68P/50V
C731 68P/50V
C733 150P/50V
C734 100P/50V
C741 100P/50V
L701
L702
L703
L705
L704
P503A
TO CRT BOARD
C474 0.01U/500V
C477 0.01U/500V
C476 4700P/50V
C473 4700P/50V
C735 4700P/50V
C721 220U/10V
C472 100P/50V
C737 68P/50V
C736 68P/50V
C484 100P/50V
C471 150P/50V
145V
GND
85V
12.5V
6.3V
OSD5V
HFLB
VTTL
CLBL
SDA1
SCL1
ABL
B1


SCL1
SDA1
H-V.CLK
FOCUS A
R328 D1.1K 1%
D302 1N4..48
+5V
C480 100P 50V
R418 11K 1%
C405 6800P 50V PEN
C406 PEN 2% 0.01U 50V
R419 2.7K +-1%
R420 1.13K +-1%
R421 5.1K
C407 0.1U
1600P PEN
C408
C301 0.1U 5% PEN
R301 22.1K 1%
C302 0.15U MEN
R302 100K 1%
C427 0.012
R447 1M
R303 100
R304 100
R718 6.8K
HUN.LUCK
X-RAY TEST
32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17
FOCUS H-S HPLL2 HCAP HBEF HBUF HPLL1 HGND VCAP VREF VAGC V-S ASCOR SDA SCL HUN. LOCK
I401 TDA4854
HFLB XARY BOP BSENS BIN BDRV PGND HDRV DGND VCC EWDRV VOUT2 VOUT1 VSYNC HSYNC CLBL
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
40V
R403 11K 1% 1/4W
R404 13K 1/4W 1%
R405 3.01K 1/4W 1%
C401 47U 35V
C402 0.1U
D426 1N4148
BSENS
55V
HVM
9V
XRP
HFLB
R401 470
PEN
C843 0.1U
R845 1M
R848 24K
R856 10K
R495 100K
C303 100P
R315 100
C304 100P
R316 100
R317 100
C305 100P
R318 100
C306 100P
R319 100
R412 75K 1/2W
R415 120K
R413 43.2K 1%
R414 10K 1%
R432 100/1W
12.5V
R308 470 1/2W
C309 47U 63V
Q415 A733
Q413 2SC945
D410 1N4148
R481 2K
R482 4.3K
R847 2.2M
D822 1N4148
C403 10P
C842 0.47U/50V
C844 0.1U PEN
R858 5.1K
C404 470U/16V
L408 100uH
R410 1K
Q416 2SA1015
Q417 2SC1015
R480 10K
C442 3300P PEN
C485 0.068U 50V PEN
R411 2.7K
ZD401 9.1C
C469 470U 16V
C314 0.1U 50V
C310 220U 25V
R309 0.47 2W
12.5V
40V
R856 39K
C841 0.01U/100V
R857 2K
VR802 B+ EHT 1K
R409 1K
R4C4 22K
C424 0.15U/250V MEF
JUMPER
Q808 C1815
R855 1K
R839 10
Q809 C1815
R4C9 10K
D821 1N4148
R306 2K
C307 1000P
R307 1.2K
C308 1000P
I301 TDA4866
VP VFB OUTA FEEDB OUTB INA INB GND
1 2 3 4 5 6 7 8 9
R311 200 1/2W
C311 100V 0.1U (LG) 0.12U (CPT)
R312 82
L301 6mm
L302 6mm
P301 V-DY
V+
V-
R310 2.2K
R313 0.82 (LG) 1/2W 1 (CPT) 1/2W
C315
R320 4.3K
VBLK
R321 6.8K
C313 0.047
BIN
BDRV
YTTL
HTTL
CLBL
HEW


R526 39 1W 12V
ZD510 8C2
C523 0.1U
C524 47U 16V
C582 100U 16V
L964 8.2UH
C963 100U 160V
C964 0.01U 500V
C965 0.01U 500V
D964 BAY26C
D962 BAV21
C966 0.47U 100V
C961 0.47U 100V
L963 3mmx2
R967 120 1/2W (CC)
R970 82
L965 6mm
D963 1N4148
Q961 8F423
C962 1U 160V
R968 1M
R966 47K
R965 82K
VR970 100K
L511 22UH
I501 TDA4886
OSD-BCK
LIN
BIN
F/B
RIN
BOUT
GIN
VP1 (BV)
CLI
F/R
B/I
ROUT
VP (BV)
VP2 (BV)
RIN
F/G
GND
GOUT
GIN
VP3 (BV)
HFB
GNDX
SDA
SCL
R524 150
R527 39K
R528 62K
L562 6mm
R564 75 1%
R563
C564 0.1
C571 47U/16V
I901 LM2407
R522 100
C521 100U 16V
C522 0.1
C504 0.1
C534 0.1
C904 0.1U
C903 47U 25V
D904 BYV26C
D902 BAV21
L502 6mm
R504 75 1%
R503
C908 3P 500V
D901 BYV26C
C906 0.47U 100V
C901 0.47U 100V
L903 3mmx2
R907 120 1/2W (CC)
R910 82
L905 6mm
D903 1N4148
Q901 8F423
C902 1U 160V
R908 1M
R906 47K
R905 82K
VR910 100K
C951 0.01 500V
P501
B
GND
R
GND
G
GND
1N4531X6
C553 0.1
D561
D562
D501
D502
D531
D532
3mm
L561
R561 75 1%
R562 75 1%
C561 10P
C563 0.01
L501 3mm
R502 75 1%
R501 75 1%
C501 10P
C503 0.01
L531 3mm
R532 75 1%
R531 75 1%
C531 10P
C533 0.01
C581 220U/16V
R519 100
R520 100
R518 100
MTV018-08.
I502
VSSA
VCO
RP
VDDA
HFLB
SSB
SDA
SCL
VSS
RAT
GAT
BAT (BV)
FBKG
FONE H
VFLB
VDD
C513 220U 10V
C512 0.1
C510 5.6K
R511 12K
C511 0.01
R513 5.6K
R512 1M
R514 100UH
R581 10K
R515 100
C516 100P
R516 100
C515 100P
C520 0.022U PEM
R517 100
C518 0.1
C519 220U 10V
ZD511 8C2
C583 100P
L514 4.5mm
C552 1000P
C926 100P
C925 100P
C924 100P
B0510 3mm
B0511 3mm
C525 0.1
C920 0.1
C923 4700P
L910 8.2UH
C911 0.01 500V
C912 22U/160V
BD910 6mm BEAD
C921 2200P 500V
C922 1000P 500V
C915 0.01 500V
C916 22U 200V
L532 6mm
R534 75 1%
R533
I901 LM2407
L931 0.15UH
D934 BYV26C
R932 47 1/4W
D932 BAV21
C938 3P 500V
D931 BYV26C
C936 0.47U 100V
C931 0.47U 100V
L933 3mmx2
R937 120 1/2W (CC)
R940 82
L935 6mm
D933 1N4148
Q931 8F423
C932 1U 160V
R938 1M
R936 47K
R935 82K
VR940 100K
C913 0.1U 50V
C914 100U 16V
L912 6mm
D971 1N4936
L915 6mm
Z961
Z901
Z931
I901 LM2407
L901 0.12UH
D904 BYV26C
R902 47 1/4W
D902 BAV21
C908 3P 500V
D901 BYV26C
C906 0.47U 100V
C901 0.47U 100V
L903 3mmx2
R907 120 1/2W (CC)
R910 82
L905 6mm
D903 1N4148
Q901 8F423
C902 1U 160V
R908 1M
R906 47K
R905 82K
VR910 100K
C951 0.01 500V
I901 LM2407
L961 0.12UH
D964 BAY26C
R962 47 1/4W
D962 BAV21
C968 3P 500V
D961 BYV26C
C966 0.47U 100V
C961 0.47U 100V
L963 3mmx2
R967 120 1/2W (CC)
R970 82
L965 6mm
D963 1N4148
Q961 8F423
C962 1U 160V
R968 1M
R966 47K
R965 82K
VR970 100K
P502
G1
ABL
SCL1
SDA1
CLBL
VFLB
HFLB
GND
5V
6.3V
+12V
80V
GND
145V


R526 39 1W 12V
L5i1 22UH
I50i TDA4886
OSD-BLK
LIN
BIN
F/B
RIN
BOUT
GIN
VP1 (BV)
CLI
F/R
B/I
ROUT
VP (BV)
VP2 (BV)
RIN
F/G
GND
GOUT
GIN
VP3 (BV)
HFB
GNDX
SDA
SCL
ZD510 8C2
C523 0.1U
C524 47U 16V
C582 100U 16V
L964 8.2UH
C963 100U 160V
C964 0.01U 500V
C965 0.01U 500V
D962 BAV21
D964 BAY26C
R524 150
R527 39K
R528 62K
L562 6mm
R564 75 1%
R363
C564 0.1
C571 47U/16V
I901 LM2407
D961 BYV26C
C968 3P 500V
L961 0.12UH
R962 47 1/4W
R522 100
C521 100U 16V
C522 0.1
C504 0.1
C534 0.1
C966 0.47U 100V
C961 0.47U 100V
L963 3mmx2
R967 120 1/2W (CC)
R970 82
L965 6mm
D963 1N4148
Q961 BF423
R968 1M
C962 1U 160V
R966 47K
R965 82K
VR970 100K
Z961
Y901A
B
R
G
G1
G2
H.V
GND
P504
C904 0.1U
C903 47U 25V
D904 BYV26C
D902 BAV21
L502 6mm
R504 75 1%
R503
L901 0.12UH
R902 47 1/4W
C908 3P 500V
D901 BYV26C
C906 0.47U 100V
C901 0.47U 100V
L903 3mmx2
R907 120 1/2W (CC)
R910 82
L905 6mm
D903 1N4148
Q901 BF423
R908 1M
C902 1U 160V
R906 47K
R905 82K
VR910 100K
Z901
C986 100P 2KV
Z911
D911 1N4936
C919 0.01U 2KV
R913 100 2W
L913 1.5T
R914 330K/1W
L914 6mm
C988 100P 2KV
C951 0.01 500V
LM2407
I901
D934 BYV26C
D932 BAV21
L532 6mm
R534 75 1%
R533
L931 0.15UH
R932 47 1/4W
C938 3P 500V
D931 BYV26C
C936 0.47U 100V
C931 0.47U 100V
L933 3mmx2
R937 120 1/2W (CC)
R940 82
L935 6mm
D933 1N4148
Q931 BF423
R938 1M
C932 1U 160V
R936 47K
R935 82K
VR940 100K
Z931
C913 0.1U 50V
C914 100U 16V
L912 6mm
D971 1N4936
L915 6mm
R581 10K
C520 0.022U PEM
R517 100
C518 0.1
C519 220U 10V
C926 100P
BD511 3mm
BD510 3mm
C583 100P
L514 4.5mm
C552 1000P
C925 100P
C924 100P
C920 0.1
C923 4700P
C525 0.1
L910 8.2UH
C911 .01 500V
C912 22U/160V
BD910 6mm BEAD
C921 2200P 500V
C922 1000P 500V
C915 0.01 500V
C916 22U 200V
R501 100
R518 100
R520 100
P502
G1
ABL
SCL1
SDA1
CLBL
VFLB
HFLB
GND
5V
6.3V
+12V
80V
GND
145V
G2
FV